

## Trend Study 2-41-01

Study site name: Boundary Spring.

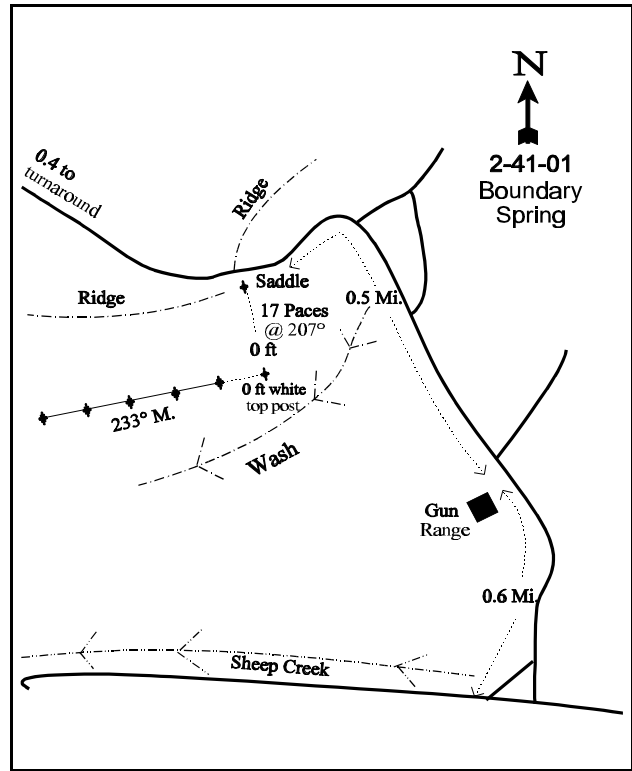
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 233 degrees magnetic.

Frequency belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

### LOCATION DESCRIPTION

From Hardware Ranch, travel south on the Ant Valley Road for 7 miles to the Sheep Creek Ranch. Turn left, go through a gate, and proceed 0.1 miles to a fork in the road. Take a right at the fork and continue on the Sheep Creek Road for 1.1 miles passing by a small reservoir. Go left and continue 0.3. At the next fork go right for 0.5 going past a gun range on the left to a fork in the road. Stay left and continue for 0.6 miles to a witness post on the left hand side of the road. From the witness post, walk 17 paces at a bearing of 207 degrees magnetic. The baseline runs 233 degrees magnetic.



Map Name: Hardware Ranch

Diagrammatic Sketch

Township 9N, Range 3E, Section 13

UTM 4596832 N, 453811 E

## DISCUSSION

### Trend Study No. 2-41

The Boundary Spring study was established in 1996 to monitor important winter range south of Hardware Ranch. The site is placed on a moderately steep (35%), south-facing slope at an elevation of about 6,700 feet. Even with the higher elevation, the browse on this slope is available for most of the winter due to the aspect and the wind blown nature of the site. The study lies on the eastern edge of the large Sheep Creek Cove development where several large cabins have been built since 1996. Quadrat frequency of deer and elk pellets were abundant in 1996 at 23% and 42% respectively. In 2001, quadrat frequency of deer pellets nearly doubled, while that of elk decreased to 6%. Cattle and domestic sheep also make use of the study site. Pellet group transect data collected in 2001 estimated 52 deer days use/acre (129 ddu/ha), 12 elk days use/acre (30 edu/ha), and less than 1 cow day use/acre (2 cdu/ha). In addition, 44 sheep pellet groups were sampled.

The soil is fairly shallow with effective rooting depth (see methods) estimated at less than 10 inches. Texture is a clay loam with a slightly alkaline soil reaction (pH of 7.4). Rock is common on the surface and throughout the profile. Due to the abundance of vegetation, litter, and rock cover, there is little unprotected bare ground. Erosion is minimal. An erosion condition class assessment completed in 2001 showed soils to be stable.

The site supports a moderate stand of antelope bitterbrush and mountain big sagebrush. Bitterbrush density was estimated at 580 plants/acre in 2001. Mature plants averaged nearly 3 feet in height and over 5 feet in width. Utilization is moderate to heavy, but vigor is normal and decadence is low at 10% or less in both sampling years. The main negative element for bitterbrush is the lack of seedling or young plants in the population. Bitterbrush annual leader growth was relatively good in 2001, averaging almost 5 inches.

Mountain big sagebrush density was estimated at 520 plants/acre in 1996, slightly increasing to 560 in 2001. Some of the shrubs display characteristics of basin big sagebrush. Utilization is mostly light with some plants displaying moderate to heavy use. Like bitterbrush, no reproduction was evident in 1996. However, an estimated 120 young plants/acre were sampled in 2001. The number of dead plants was high in 1996, outnumbering live plants. Vigor has been generally good. Percent decadence decreased in 2001 from 31% to 21%. Annual leader growth on sagebrush was relatively good on a few plants, but overall it was minimal, averaging less than 2 inches over the entire site. Other shrubs found on the site include narrowleaf low rabbitbrush, broom snakeweed, snowberry, and gray horsebrush. A few juniper are also found on the site.

Although grasses dominate the herbaceous component, composition is poor. Cheatgrass is abundant and accounted for nearly 60% of the grass cover in both 1996 and 2001. Nested frequency for cheatgrass remained nearly the same between years even with drought. Common perennial grasses include bluebunch wheatgrass, bulbous bluegrass, and Sandberg bluegrass. In 2001, bluebunch wheatgrass was noted as being large and vigorous. Forbs are severely lacking for a mountain brush community with only 7 perennial species combined being sampled in 1996 and 2001. The only abundant perennial forb is arrowleaf balsamroot which accounts for over half of the forb cover. Low growing annual forbs have a higher sum of nested frequency compared to perennials and provide nearly as much cover in 2001.

### 1996 APPARENT TREND ASSESSMENT

The soil trend appears stable due to the abundance of vegetation and litter cover. There is little exposed bare soil. Browse trend appears to be downward due to a lack of reproduction for bitterbrush and mountain big sagebrush. The sagebrush population may continue to decline. Currently, dead plants outnumber live ones. It is doubtful that sagebrush seedlings can become established when competing with the vigorous herbaceous

understory dominated by winter annuals. Composition of the herbaceous understory is poor with the abundance of cheatgrass, Japanese brome, and annual forbs. Future trends will be dependent on how the composition changes in relation to these key species.

## 2001 TREND ASSESSMENT

Trend for soil is stable. Cover of bare ground is low and vegetation and litter cover are abundant and well disbursed over the site. Erosion is minimal. Trend for browse is stable. The bitterbrush population shows stable levels of use and decadence compared to 1996. The main negative factor for bitterbrush is the lack of reproduction. The mountain big sagebrush population slightly increased in density due to the emergence of some young in the population in 2001, but whether or not the young will persist will depend in part to precipitation patterns in the future. Decadency decreased on sagebrush, and use remains mostly light. Trend for the herbaceous understory is stable, but remains in poor condition. Cheatgrass still dominates the site, but bluebunch wheatgrass and Sandberg bluegrass remained at stable nested frequencies. Except for arrowleaf balsamroot, perennial forbs remain nearly non-existent. Sum of nested frequency for perennial grasses and forbs slightly increased.

### TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

### HERBACEOUS TRENDS --

Herd unit 02 , Study no: 41

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	Agropyron spicatum	152	153	50	52	6.18	6.96
G	Bromus japonicus (a)	45	*9	15	3	.37	.06
G	Bromus tectorum (a)	400	404	91	92	13.58	17.43
G	Poa bulbosa	42	*85	13	23	1.92	4.04
G	Poa fendleriana	-	-	-	-	.00	-
G	Poa secunda	138	123	52	45	1.95	1.67
G	Sitanion hystrix	-	3	-	1	-	.00
Total for Annual Grasses		445	413	106	95	13.95	17.50
Total for Perennial Grasses		332	364	115	121	10.06	12.68
Total for Grasses		777	777	221	216	24.02	30.19
F	Achillea millefolium	2	5	1	1	.03	.03
F	Alyssum alyssoides (a)	292	298	83	85	1.50	3.19
F	Astragalus utahensis	3	-	2	-	.04	-
F	Balsamorhiza sagittata	32	45	20	22	5.55	6.32
F	Collinsia parviflora (a)	12	1	4	1	.07	.00
F	Descurainia pinnata (a)	-	5	-	1	-	.00
F	Draba spp. (a)	-	4	-	2	-	.01

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	Epilobium brachycarpum (a)	13	*-	7	-	.06	-
F	Erodium cicutarium (a)	-	*36	-	13	-	1.21
F	Eriogonum umbellatum	-	2	-	1	-	.00
F	Galium aparine (a)	3	-	1	-	.00	-
F	Hedysarum boreale	-	1	-	1	-	.03
F	Holosteum umbellatum (a)	40	50	17	19	.11	.09
F	Lactuca serriola	4	-	3	-	.06	-
F	Microsteris gracilis (a)	2	1	1	1	.00	.00
F	Ranunculus testiculatus (a)	27	10	14	6	.09	.03
F	Tragopogon dubius	15	7	7	5	.09	.07
F	Veronica biloba (a)	3	2	1	1	.00	.00
Total for Annual Forbs		392	407	128	129	1.85	4.56
Total for Perennial Forbs		56	60	33	30	5.78	6.46
Total for Forbs		448	467	161	159	7.64	11.02

\* Indicates significant difference at alpha = 0.10 (annuals excluded)

#### BROWSE TRENDS --

Herd unit 02 , Study no: 41

T y p e	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Amelanchier alnifolia	0	1	-	.15
B	Artemisia tridentata vaseyana	18	20	3.36	4.71
B	Chrysothamnus viscidiflorus viscidiflorus	14	13	1.31	1.27
B	Gutierrezia sarothrae	8	12	.36	.15
B	Juniperus osteosperma	0	1	.00	.15
B	Purshia tridentata	27	23	8.30	7.92
B	Symphoricarpos oreophilus	2	1	.03	.15
B	Tetradymia canescens	4	4	.79	.30
Total for Browse		73	75	14.17	14.81

BASIC COVER --

Herd unit 02 , Study no: 41

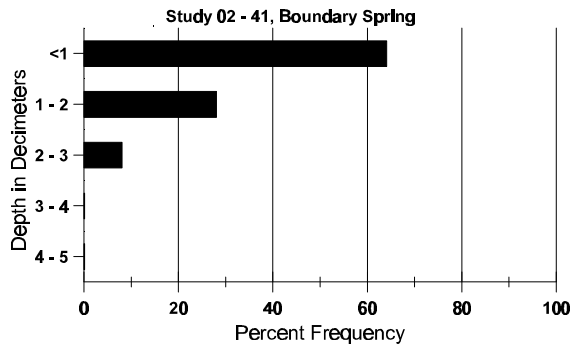
Cover Type	Nested Frequency		Average Cover %	
	'96	'01	'96	'01
Vegetation	489	474	45.95	58.81
Rock	339	285	16.20	11.49
Pavement	202	266	3.28	5.13
Litter	495	482	48.12	49.75
Cryptogams	50	31	.42	.66
Bare Ground	128	151	2.49	4.35

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 41, Boundary Spring

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
9.5	62.8 (11.6)	7.4	42.7	30.0	27.3	3.4	14.2	214.4	.6

## Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 41

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre '01	Days Use per Acre (ha) '01
Sheep	5	10	383	N/A
Rabbit	1	1	-	-
Elk	42	6	157	12 (30)
Deer	23	38	679	52 (129)
Cattle	5	-	9	<1 (2)

## BROWSE CHARACTERISTICS --

Herd unit 02 , Study no: 41

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Amelanchier alnifolia																		
Y	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	23	16	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%										
'01		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)														'96	0	Dec:	-	
														'01	20		-	
Artemisia tridentata vaseyana																		
Y	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
M	96	17	1	-	-	-	-	-	-	-	18	-	-	-	360	27	41	18
	01	13	1	1	-	-	-	1	-	-	15	-	-	1	320	30	42	16
D	96	-	6	2	-	-	-	-	-	-	8	-	-	-	160			8
	01	4	2	-	-	-	-	-	-	-	5	-	-	1	120			6
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	660			33
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	180			9
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		27%			08%			00%			+ 7%							
'01		11%			04%			07%										
Total Plants/Acre (excluding Dead & Seedlings)														'96	520	Dec:	31%	
														'01	560		21%	
Chrysothamnus viscidiflorus viscidiflorus																		
M	96	23	-	-	-	-	-	-	-	-	23	-	-	-	460	16	24	23
	01	18	-	-	-	-	-	-	-	-	17	1	-	-	360	13	22	18
D	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			-17%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)														'96	460	Dec:	0%	
														'01	380		5%	

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Gutierrezia sarothrae																		
S	96 01	- 1	- -	- -	- -	- -	- -	- -	- -	- -	- 1	- -	- -	- -	0 20		0 1	
M	96 01	16 19	- -	- -	- -	- -	- -	- -	- -	- -	16 19	- -	- -	- -	320 380	8 11 7 13	16 19	
D	96 01	- 1	- -	- -	- -	- -	- -	- -	- -	- -	- 1	- -	- -	- -	0 20		0 1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			+20%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96 '01	320 400	Dec:	0% 5%			
Juniperus osteosperma																		
S	96 01	1 -	- -	- -	- -	- -	- -	- -	- -	- -	1 -	- -	- -	- -	20 0		1 0	
Y	96 01	- 1	- -	- -	- -	- -	- -	- -	- -	- -	- 1	- -	- -	- -	0 20		0 1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%										
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96 '01	0 20	Dec:	- -			
Purshia tridentata																		
M	96 01	4 6	27 14	- 4	1 -	- 2	- -	- -	- -	- -	32 24	- 2	- -	- -	640 520	29 52 35 63	32 26	
D	96 01	- 1	- 1	3 1	- -	- -	- -	- -	- -	- -	3 3	- -	- -	- -	60 60		3 3	
X	96 01	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	160 20		8 1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		77%			09%			00%			-17%							
'01		59%			17%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'96 '01	700 580	Dec:	9% 10%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Symphoricarpos oreophilus																		
M	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	17	23	1
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	20	25	1
D	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		50%			00%			00%			-50%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)														'96	40	Dec:	50%	
														'01	20		0%	
Tetradymia canescens																		
M	96	11	-	-	-	-	-	-	-	-	11	-	-	-	220	12	25	11
	01	6	-	-	-	-	-	-	-	-	6	-	-	-	120	9	21	6
D	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'96		00%			00%			00%			-36%							
'01		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)														'96	220	Dec:	0%	
														'01	140		14%	